

WHY SHOULD WE BE CONCERNED ABOUT DIABETES?

Is Diabetes a Serious Health Problem?

Diabetes is indeed a serious, costly, and potentially life-threatening disease that touches the lives of everyone, no matter what age, race, or sex. Over 100 million people worldwide have diabetes¹ including 16 million in the United States (U.S.)², and about 2 million in California. Virtually everyone has a relative, co-worker, or friend with the disease and as taxpayers, each of us contributes to the medical care of those who are unable to pay.

Diabetes can be a deadly disease, if not properly managed. Diabetes has consistently ranked as a top-ten leading cause of death in the U.S. since 1932,³ and has ranked in the top ten causes of death in California eight out of the last ten years (1983–1993).⁴ Age-adjusted mortality rates remained fairly constant for Whites but increased among Blacks during this time period.⁵ From 1989 to 1993, about 18,000 deaths in California, or about 3,500 deaths per year, were directly attributed to diabetes.⁶ However, this is an extremely conservative estimate of the actual number of deaths in which diabetes plays a significant role.

Both deaths from diabetes and hospitalizations of those with the disease are serious health concerns. In 1990, about 3 million hospitalizations in the U.S. listed diabetes as one of the discharge diagnoses. These 3 million hospitalizations resulted in 24.5 million days of hospital stay.⁵ In 1992, approximately 300,000 California hospital discharges listed diabetes as one of the top 10 diagnoses. These hospitalizations represented 2.4 million days, or 6,575 years, of hospital stay.⁷

The health-care costs of diabetes in the U.S. are staggering—an estimated \$105 billion in 1992 according to one study.⁸ California's share of this cost in 1992 was approximately \$12 billion from all sources. Although this estimate is enormous, it is probably a conservative one because lost wages, productivity, nursing home care costs, and nonprescription drugs are not included. Without significant improvements and interventions in the prevention, detection, and control of diabetes, the number of people with this disease, and the costs will continue to grow.

Diabetes can be a deadly disease, if not properly managed.

The problem can be failure to produce insulin, tissue resistance to insulin, or both.

What Exactly is Diabetes?

Diabetes is a disease that interferes with the body's ability to use digested food for energy. After eating, the body begins to break down the food to different substances that the body can use. One of these products, glucose, (or blood sugar) is used for energy. When glucose levels rise in the body, a substance called insulin, made by the pancreas, is released to help turn the glucose into energy. In people with diabetes, this process does not work correctly. The problem can be failure to produce insulin, tissue resistance to insulin, or both.

There are two major types of diabetes: insulin-dependent, also known as Type I or juvenile onset, and non-insulin-dependent, also known as Type II or adult onset. Either type can lead to long-term health problems even though they may have different causes, treatments, and short-term health effects. Either type of diabetes can take its toll on many different body systems and organs. Heart disease, stroke, kidney failure, blindness, nerve damage, and lower extremity amputations are serious complications that frequently result from this disease. The goal for people with either type of diabetes is to control the blood glucose level and, therefore, delay or decrease the severity of life-threatening complications.

In those persons with insulin-dependent, or Type I diabetes, the pancreas does not produce insulin. Daily injections of insulin are required for survival. Although most cases of Type I diabetes are diagnosed in those less than 30 years old, onset of the disease may occur later in life.

About 90 percent of those who have diabetes are Type II, non-insulin-dependent. For those with Type II diabetes, insulin production is defective and tissue resistance to insulin develops. For many persons with Type II diabetes, daily insulin supplementation is not required. They manage their diabetes by making moderate changes in diet and exercise.

One of the most significant features of Type II diabetes is that the disease may be prevented in persons at risk by routine exercise, weight loss, and a proper nutrition plan. Therefore, early intervention and prevention programs designed by local and state public health agencies could prove to be very effective in decreasing the burden of diabetes in California.

What are the Symptoms of Diabetes?

Perhaps the most dangerous and striking feature of diabetes is that half of the people with this disease are unaware they have it because symptoms may be absent or may develop gradually and are often vague and nonspecific. In many people, this may lead to severe, life-threatening, and irreversible complications before they are aware that they have this disease. These symptoms may appear suddenly or slowly over a long time period and may include one or more of the following:

- ✓ extreme fatigue
- ✓ increased thirst
- ✓ frequent urination
- ✓ unexplained weight loss
- ✓ blurred vision
- ✓ slow healing of skin, gum and urinary tract infections
- ✓ genital itching in women

What Causes Diabetes?

Scientists have not found the cause of either Type I or Type II diabetes. However, we do know that in Type I diabetes, the body's own immune system turns inward and attacks the cells that produce insulin. Family history of diabetes and an exposure to viruses or other substances early in life may play a role in acquiring this disease. In Type II diabetes, family history and obesity are known to be risk factors for the development of the disease. Research indicates that if excess weight is distributed mostly in the abdominal area, an even greater risk is present.^{9, 10}

Half of the people with diabetes are unaware they have the disease.

COLLECTION, ANALYSIS, AND REPORTING OF DIABETES DATA

The California Diabetes Surveillance System (DSS)

Routine collection, analysis, and reporting of diabetes data is a crucial function of public health agencies. Results from these surveillance data are useful to numerous individuals and groups including:

1. Public health officials for detecting new or unusual trends that demand a public health response;
2. Public health officials for planning, implementing, and evaluating screening, prevention, and intervention programs;
3. Legislators for determining priorities and levels of public health funding to decrease the burden of diabetes;
4. Local, state, and national diabetes organizations for targeting research priorities; and
5. Health care providers for targeting high-risk groups for special attention.

Several sources of diabetes data are available in California, including death certificates listing causes of death, hospital discharge summaries showing diagnoses at discharge, and special surveys, such as the Behavioral Risk Factor Surveillance System (BRFSS) described below. Each of these sources provides a valuable piece of the diabetes puzzle. However, this first in an

on-going series of California DSS reports includes only results from ten years of the California BRFSS data. Subsequent reports will include statewide and county-specific results from other sources, such as death certificates and hospital discharges.

BRFSS

BRFSS is an ongoing statewide telephone survey conducted by CDHS in collaboration with the Centers for Disease Control and Prevention. Since 1984, BRFSS has collected information on a wide variety of behaviors associated with chronic diseases, such as smoking, alcohol use, and exercise by selecting a representative sample of adults aged 18 and older from the California population.

Results presented in this report are for the 10-year period 1984 through 1993 which includes over 23,000 respondents. A table showing the number of people in each age, racial/ethnic, and sex category is presented in the Appendix, as is a description of the study methods. All data presented here have been adjusted to reflect the age, race, and sex characteristics of the 1990 California population.

BRFSS is an ongoing statewide telephone survey. In the 10 year period between 1984 and 1993, there were over 23,000 respondents

DIABETES IN CALIFORNIA

Characteristics of Those With Diabetes

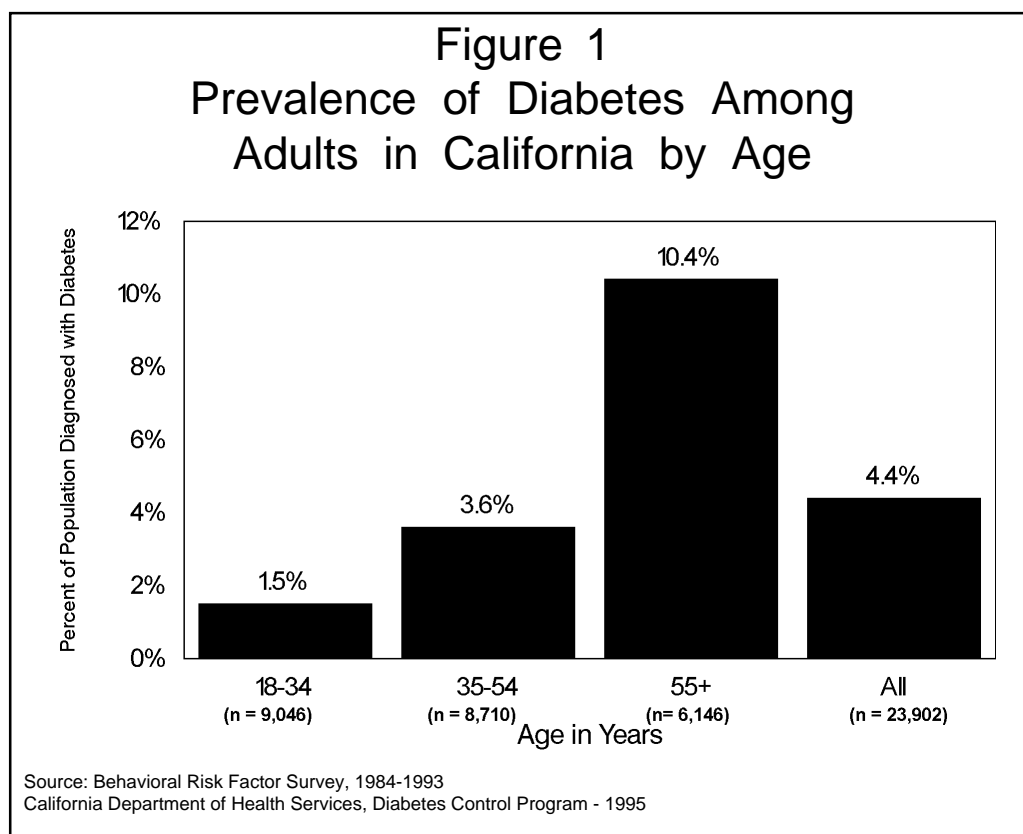
Diabetes is a significant health problem for Californians. Statewide, more than 4 percent of adults have been told that they have diabetes. This means that 1 in every 23 Californians may face the potentially devastating complications of this disease, including cardiovascular disease, blindness, amputation of the lower extremities, and kidney failure. Another 1 in 23 has the disease, but does not know it.

As people age, their risk for being diagnosed with diabetes increases significantly (Figure 1). Less than 2 percent of persons

aged 18 to 34 have been diagnosed with diabetes. However, among persons aged 35 to 54, the proportion of people with diabetes more than doubles, to nearly 4 percent. Californians, aged 55 and older, are especially at risk. About 10 percent of those aged 55 and older have been diagnosed with Type II diabetes.

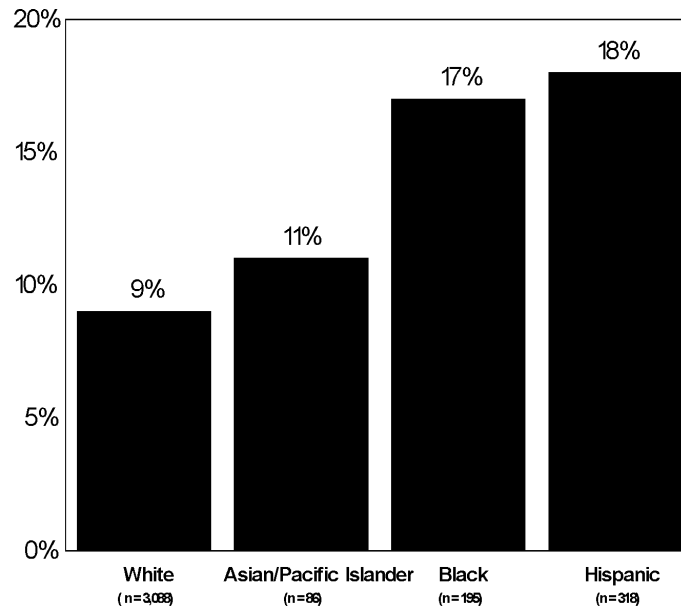
Diabetes is more common among women than men, although it is a significant health problem for both sexes. Among women in California, 5.2 percent have been told they have diabetes, compared to 3.6 percent of men.

Hispanic and Black women aged 55 and over have the highest diabetes prevalence.



As people age, their risk for being diagnosed with diabetes increases significantly.

Figure 2
Prevalence of Diabetes Among
Women over Age 55 by Race/Ethnicity



Source: Behavioral Risk Factor Survey, 1984-1993
 California Department of Health Services, Diabetes Control Program - 1995

No significant overall differences in diabetes were found among racial/ethnic groups. However, when we examine race/ethnic groups by age, we find significant differences. The highest risk of being diagnosed with diabetes is among women aged 55 years and older (*Figure 2*).

Hispanic and Black women, aged 55 and older, have the highest diabetes prevalences in the State, approximately twice that of non-Hispanic White women in this age group. The differences between White women and both Black and Hispanic women are statistically significant. The differences between Asian/

Pacific Islander women and both Black and Hispanic women are not statistically significant.

Persons without health insurance and those on Medi-Cal are at increased risk for having diabetes. One reason for this finding may be that persons disabled by diabetes are more likely to be enrolled in Medi-Cal than the general population. Among persons with Medi-Cal coverage, 10.5 percent report that they have been diagnosed with diabetes, compared to 3.9 percent of persons who are not covered by Medi-Cal.

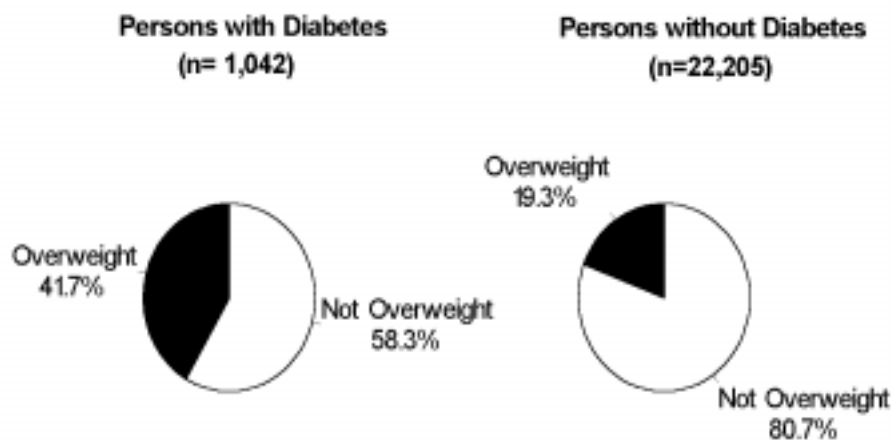
Risk Factors and Complications

A person who is obese is more likely to develop Type II diabetes than one who is not obese. Overweight is defined by calculating a Body Mass Index (BMI) score for each individual⁹. BMI is calculated by the individual's weight in kilograms divided by the height in meters. Male respondents are considered overweight if they had a BMI of 27.8 or higher, while females were considered overweight if they had a BMI of 27.3 or higher.

Nearly 42 percent of our persons-with-diabetes sample are overweight, compared to only 19 percent of persons without diabetes (Figure 3). An awareness of maintaining a normal weight and a healthy nutrition plan is especially important in persons with Type II diabetes, since the disease can be controlled, and sometimes prevented, through weight loss and good nutrition.

Persons with diabetes are nearly three times as likely to have hypertension as persons without diabetes.

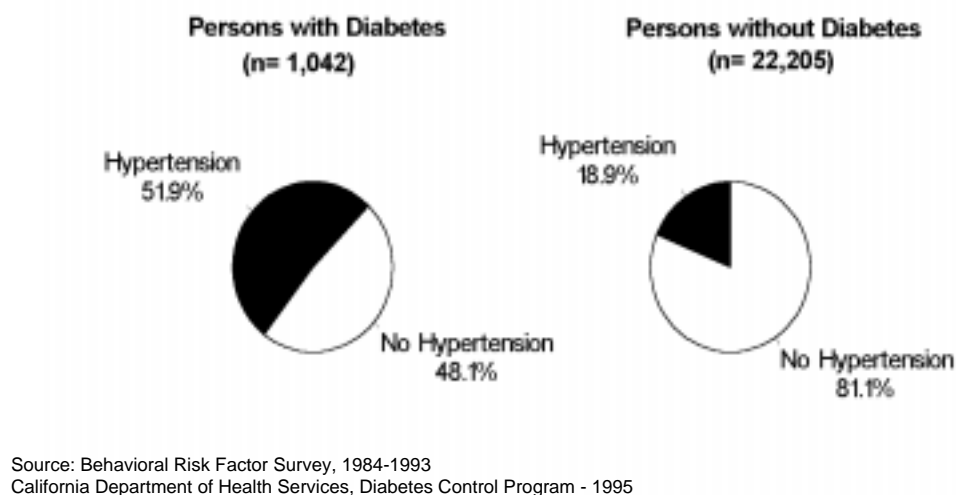
Figure 3
Prevalence of Overweight Among Californians by Diabetes Status



Source: Behavioral Risk Factor Survey, 1984-1993
California Department of Health Services, Diabetes Control Program - 1995

An awareness of maintaining a normal weight and a healthy nutrition plan is especially important in persons with diabetes.

Figure 4
Prevalence of Hypertension
Among Californians by Diabetes Status



Hypertension, or high blood pressure, is a risk factor for heart attack and stroke. Persons with diabetes are nearly three times as likely to have hypertension as persons without diabetes (*Figure 4*). More than half (52 percent) of all adults diagnosed with diabetes have high blood pressure, compared to 19 percent of those who do not have diabetes.

Exercise can reduce the risk of being diagnosed with diabetes, and can help prevent serious complications in those who already have the disease. Unfortunately, about 62 percent of persons with diabetes report that they engage in no leisure-time physical activities (*Figure 5*). This compares to about 53 percent of persons without diabetes.

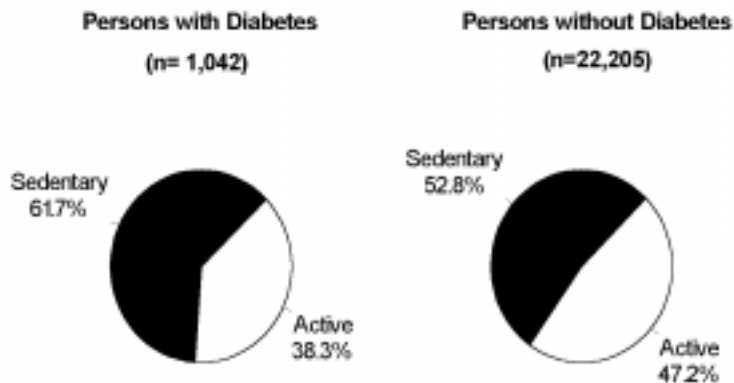
In addition to being a risk factor for lung cancer, emphysema, asthma, bronchitis, and heart disease, smoking cigarettes can worsen

the complications of diabetes. Because of the grave nature of these side effects, persons with diabetes should not smoke. However, one of every five Californians with diabetes smokes cigarettes regularly. Unfortunately, the proportion of smokers among those who have diabetes is about the same as among those who do not have diabetes (*Figure 6*).

Diabetes Care and Management

Persons with diabetes must continuously strive to maintain blood sugar levels as close to normal as possible in order to prevent or delay the onset of serious complications. All persons with Type I diabetes, and some persons with Type II diabetes, must use insulin to manage their diabetes. Among all persons diagnosed with diabetes, about 25 percent must use insulin on a regular basis, according to our survey.

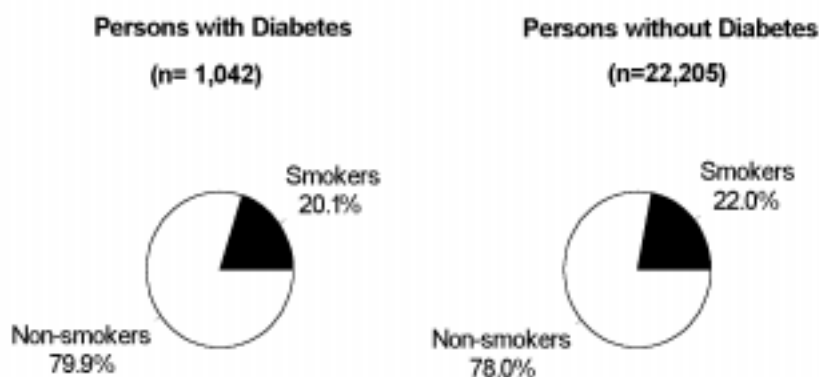
Figure 5
Prevalence of Sedentary Habits Among
Californians by Diabetes Status



Source: Behavioral Risk Factor Survey, 1984-1993
California Department of Health Services, Diabetes Control Program - 1995

Exercise can help
By the year 2020,
prevent serious
there will be more
complications of
than 2 million
diabetes.
people diagnosed
with diabetes in
California, more
than double the
current number.

Figure 6
Prevalence of Cigarette Smoking
Among Californians by Diabetes Status



Source: Behavioral Risk Factor Survey, 1984-1993
California Department of Health Services, Diabetes Control Program - 1995

Unfortunately, the
proportion of
smokers among
those who have
diabetes is about
the same as among
those who do not
have diabetes.

Diabetes in the Future

California's population is expected to go through some significant changes in the coming years. The number of people living in the State will continue to expand. The average age of the population will also increase. Non-Hispanic Whites will constitute a smaller proportion of the overall California population, and Hispanics and Asians will comprise a much larger proportion of the population. These changes are expected to have a significant impact on diabetes in the State, since older persons and those of Hispanic ethnicity are especially at risk for diabetes.

The population projections¹¹ for the year 2020 were multiplied by the current diabetes prevalence for each sex, race, and age subgroups in the population. This resulted in estimates of the numbers of persons with diabetes for each sex, race, and age group in the year 2020. These values were summed to obtain an overall population estimate. This population estimate indicates that the growth in the number of persons with diabetes will outpace the growth of the California population over the next 25 years. By the year 2020, there will be more than 2 million people diagnosed with diabetes in California, more than double the current number. During the same time period, the total population will increase only by 54 percent. The additional number of people with *undiagnosed* diabetes is also estimated to be 2 million people which amounts to a total of 4 million people with diabetes. Again, this is a doubling of the population with diabetes.

Summary

Analysis of ten years of the BRFSS data has shown that age, female gender, and the combination of these traits with being Black or Hispanic, increase the chances of developing diabetes. In addition to these unalterable characteristics, modifiable conditions contribute to Type II diabetes vulnerability. Some of these conditions are overweight, hypertension, and sedentary habits.

One of the findings of this report invites further investigation. We want to learn why Medi-Cal beneficiaries are twice as likely to have diabetes as persons who are not Medi-Cal beneficiaries. Perhaps persons disabled by diabetes, as a result, may have to enroll in Medi-Cal. Additional analyses will be conducted.

The number of persons with diabetes is expected to double by the year 2020. Modifying lifestyles, especially of persons at greatest risk for Type II diabetes, is one way to avoid this potential health care crisis.

Subsequent diabetes reports will describe the Medi-Cal analyses and progress on the action recommendations. Data from sources other than BRFSS, such as hospital discharge, and death certificate files, also will be presented in later reports.

IMPORTANT CONCLUSIONS

Based on the findings of this report and other relevant studies, the following conclusions are offered:

1. Diabetes and its complications represent a significant burden in California. Programs for the prevention, early detection, and treatment of diabetes should be encouraged throughout the State, especially in high-risk minority populations, in order to reduce diabetes-related costs in the future.
2. A million California adults have undiagnosed diabetes. Greater effort should be put into identifying persons with previously undiagnosed Type II diabetes.
3. Because Black and Hispanic women, aged 55 and up, have very high rates of diabetes. Women in these groups and other high risk patients should be screened regularly for diabetes.
4. Insufficient exercise, overweight, and high blood pressure are much more common among persons with diabetes than among other Californians. This greatly contributes to diabetes morbidity. People with diabetes should be referred to exercise and nutrition programs where appropriate.
5. Smoking rates are unacceptably high among persons with diabetes than among those without the disease. Special efforts should be made to help persons with diabetes quit smoking.

Programs for the prevention, early detection, and treatment of diabetes are essential for better health outcomes.

REFERENCES

1. International Diabetes Federation, 1991 Directory.
2. Centers for Disease Control, *1995 Diabetes Fact Sheet*. Atlanta, GA, U.S. Department of Health and Human Services, Public Health Services, 1995.
3. DCCT Research Group. *The Diabetes Control and Complications Trial (DCCT): design and methodologic considerations for the feasibility phase*. *Diabetes*. 1986; 35:530–545.
4. California Department of Health Services, Vital Statistics Section-Personal Communication.
5. Centers for Disease Control, *Diabetes Surveillance*, 1993. Atlanta, GA, U.S. Department of Health and Human Services, Public Health Services, 1993.
6. Farrar JA, Bohnstedt M, Perkins CA. *Diabetes Mortality*. California Department of Health Services, Division of Chronic Disease Control. Unpublished data.
7. Reynen DJ, Farrar JA, Bohnstedt M. *Diabetes-Related Hospital Discharges*. California Department of Health Services, Division of Chronic Disease Control. Unpublished data.
8. Rubin RJ, Altman WM, Mendelson DN. Health care expenditures for people with diabetes mellitus, 1992. *Journal of Clinical Endocrinology* 78:4:809A-809F.
9. Pi-Sunyer FX. Health Implications of obesity. *Am J Clin Nutr* 1991; 53: 1595s-1630s.
10. Stern MP, Haffner SM. Body fat distribution and hyperinsulinemia as risk factors for diabetes and cardiovascular diseases. *Arteriosclerosis* 1986;6:123-130.
11. State of California, *Projected Total Population of California Counties: 1990 to 2040, Report 93 P-3*, Sacramento, California, May 1993.

TECHNICAL APPENDIX to *Diabetes Data: Prevalences and Risk Factors*

Table A

Characteristic	Number Interviewed	Percent with Diabetes	Estimated Number of Adults with Diagnosed Diabetes
<u>Age</u>			
18-34 yrs	9,046	1.5%	128,955
35-54	8,710	3.6%	270,504
55+	6,146	10.4%	<u>587,714</u>
		Total	987,173
<u>Gender</u>			
Male	10,614	3.6%	425,084
Female	13,288	5.2%	<u>562,089</u>
		Total	987,173
<u>Race/Ethnicity</u>			
White	16,289	4.3%	570,643
Black	1,518	5.9%	53,598
Hispanic	4,400	4.6%	236,549
Asian/PI	1,292	3.6%	<u>90,306</u>
		Total	951,096

Methods

BRFSS has been conducted since 1984, using a computer-assisted telephone interview system. Participants are selected using the Waksberg method, a multi-stage cluster sampling technique. The sampling methodology is designed to generate a random sample of California telephone numbers, including unlisted and new subscribers.

Prior to analysis, all interviews are weighted to account for the probability of being drawn into the sample, and to adjust the sample to reflect the age, race/ethnicity and sex-specific distribution of the 1990 California population. Standard errors are calculated using SESUDAAN, a computer program specifically designed for analysis of multi-stage sample surveys.

Annual sample sizes for the data presented in this report appear in Table B.

Table B - BRFSS Sample Sizes	
Year	Sample
1984	1086
1985	1369
1986	1569
1987	1784
1988	2444
1989	2398
1990	2701
1991	2995
1992	3982
1993	3610

The confidence interval (CI) around results from a sample survey, such as a percentage, indicates the range of values that probably contains the true value in the population from which the sample was drawn.

Tables C and D show CIs (labeled “high” and “low”) along with estimates of diabetes prevalence (labeled “%” in the data table) for various demographic groups. For instance, in Table B, 1.5 percent of people, aged 18-34 years, are estimated to have diabetes.

Table C - Prevalence (%) of Diabetes and 95% Confidence Intervals by Age, Gender and Race/Ethnicity			
Grp.	High	%	Low
18-34	1.8	1.5	1.2
35-54	4.1	3.6	3.1
55+	11.4	10.4	9.5
Male	4.0	3.6	3.2
Female	5.7	5.2	4.7
White	4.7	4.3	3.9
Black	7.5	5.9	4.3
Hispanic	5.3	4.6	3.8
A/PI	4.9	3.6	2.2
Other	5.3	3.2	1.2

However, due to chance, the actual percentage in the population could be from 1.2 percent to 1.8 percent. Since CIs for the three age groups do not overlap each other, their prevalences estimate differences that are statistically significant. That is to say there is a significant relationship between age and diabetes.

Table D -Prevalence (%) of Diabetes and 95% Confidence Intervals Among Women, Aged 55+ Years			
Grp.	High	%	Low
White	10.0	8.8	7.6
Black	23.0	16.7	10.4
Hisp.	23.3	18.3	13.2
A/PI	18.0	11.1	4.3
Other	17.5	7.0	0

Table E - Prevalence of Diabetes and 95% Confidence Intervals by Age, Gender and Race/Ethnicity		
Aged 55+	Prevalence (%)	95% Confidence Intervals
White Men	9.7	8.0 - 11.3
Black Men	13.1	4.0 - 22.2
Hispanic Men	11.4	6.6 - 16.2
Other Men	11.6	5.0 - 18.1
Aged 55+		
White Women	8.8	7.6 - 10.0
Black Women	16.7	10.4 - 23.0
Hispanic Women	18.3	13.2 - 23.3
Other Women	9.7	3.9 - 15.5
Aged 35-54		
White Men	2.7	1.9 - 3.4
Black Men	2.1	0.4 - 3.8
Hispanic Men	4.7	2.8 - 6.5
Other Men	2.0	0.7 - 3.4
Aged 35-54		
White Women	3.5	2.7 - 4.3
Black Women	6.8	3.6 - 10.1
Hispanic Women	6.1	4.1 - 8.2
Other Women	2.5	0.9 - 4.2
Aged 18-34		
White Men	0.9	0.4 - 1.3
Black Men	0	0.0 - 0.0
Hispanic Men	0.5	0.2 - 0.9
Other Men	2.3	0.0 - 5.3
Aged 18-34		
White Women	2.0	1.4 - 2.5
Black Women	2.7	0.9 - 4.4
Hispanic Women	2.9	1.9 - 4.0
Other Women	2.0	0.5 - 3.6

LET US HEAR FROM YOU!

Did you find this report useful? How can we improve it? Please FAX or mail your reply within two weeks of receiving this diabetes report to the address below.

Your Name: _____

Agency: _____

Address: _____

Telephone: _____

1. What is your position?

☐ Epidemiologist

☐ Physician

☐ Nurse

☐ Nutritionist

☐ Health Educator

☐ Legislator/Legislative Staff

☐ Health Administrator

☐ CBO Staff

☐ Other _____

2. Does your agency have a diabetes program listed on your current organizational chart?

☐ Yes

☐ No

☐ Not applicable

3. If you have read 50% or more of the document, how would you rate it *for your purposes*?

☐ Very good

☐ Good

☐ Fair

☐ Poor

☐ Very poor

☐ Not read 50%

4. Do you have any suggestions for improvement in the document?

(Use a second sheet if necessary)

☐ Yes

☐ No

Mail To:

Department of Health Services,
Chronic Disease Control Branch
Diabetes Control Program, MS-725
P.O. Box 942732, Sacramento, CA 94234-7320
Phone: (916) 327-6985 FAX: (916) 324-7764
E-mail annalb@itsa.ucsf.edu